SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-43

Name: Lake Thompson **Counties**: Kingsbury and Miner
Legal Description: T110N-R55W-Sec.20-22, 28-33; T109N-R55W-Sec.4-9, 16-17; T110N-R56W-Sec.36; T109N-R56W-Sec.1.
Location from nearest town: 6 miles south and 4 miles east of DeSmet, SD.

Dates of present survey: August 2-4, 2010 (netting); Sept. 28, 2010 (electrofishing)
Dates of last survey: August 3-5, 2009 (netting); Sept. 22, 2009 (electrofishing)

Managed Species	Other Species
Walleye	Northern Pike
Yellow Perch	Black Crappie
Smallmouth Bass	Black Bullhead
	White Sucker
	Common Carp

PHYSICAL DATA

Surface area: 16,236 acres
Maximum depth: 26 feet
Volume: 148,692 acre-feet
Contour map available: Yes
OHWM elevation: None set
Outlet elevation: None set
Watershed area: 263,044 acres
Mean depth: 14.5 feet
Shoreline length: 44.6 miles
Date mapped: 2002
Date set: NA
Date set: NA
Lake elevation observed during the survey: Full
Beneficial use classifications: (4) Warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

Lake Thompson, located in central Kingsbury County, was named for John Thompson, a pioneer farmer and Civil War veteran. Lake Thompson had been nothing but a shallow marsh until heavy precipitation in the early 1980s caused the lake to grow to over 16,000 acres and almost 30 feet in depth. It is now one of the more important fisheries in eastern South Dakota.

Ownership of Lake and Adjacent Lakeshore Properties

The State of South Dakota Listing of Meandered Lakes lists 8,000 acres of the original lakebed as meandered. The balance of lake ownership is divided between private landowners, the South Dakota Department of Game, Fish, and Parks (GFP), and the United States Fish and Wildlife Service. The GFP Wildlife Division manages the fishery and Game Production Areas while the Parks Division manages the Recreation and Lake Access Areas.

Fishing Access

The Northeast Access Area, located on the northeast corner of the lake, has a double lane boat ramp, dock, parking lot, public toilet and shore fishing access. The Lake Thompson Recreation Area, also located on the northeast shore of the lake, has a double lane boat ramp, dock, public toilet, parking lot, campgrounds, swim beach, and shore fishing access. The North Access Area, located on the northwestern shore of the lake, has a boat ramp, dock, public toilet and shore fishing access. The West Access Area, located on the west shore of the lake, has a double lane boat ramp, dock, public toilet, parking lot, and shore fishing access.

Field Observations of Water Quality and Aquatic Vegetation

During the lake survey, the Secchi depth measurement was 0.737 m (29.0 inches). Sago pondweed (*Potamogeton pectinatus*) was observed during the survey. Water temperatures were around 25.6^{o}C (78 ^{o}F). Lake Thompson was full at the time of the survey, and water was flowing into the lake from all of the inlets.

BIOLOGICAL DATA

Methods:

Lake Thompson was sampled on August 2-4, 2010 with three overnight gill-net sets and 11 overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Forty minutes of nighttime electrofishing was done on September 28, 2010 to evaluate walleye recruitment. Sampling sites are displayed in Figure 5.

Results and Discussion:

Gill Net Catch

Walleye (73.8%) and yellow perch (19.7%) were the most abundant species sampled in the gill nets this year (Table 1). Common carp, white bass, northern pike, black crappie, and white sucker were also sampled.

Table 1. Total catch from three overnight gill net sets at Lake Thompson, Kingsbury County, August 2-4, 2010.

Species	No.	%	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Walleye	135	73.8	45.0	±11.1	28.4	13	1	89
Yellow Perch	36	19.7	12.0	±9.8	17.9	69	50	112
Common Carp	4	2.2	1.3	±0.4	4.1	--	--	--
White Bass	3	1.6	1.0	±0.7	0.4	--	--	--
Northern Pike	2	1.1	0.7	±0.9	0.8	--	--	--
Black Crappie	2	1.1	0.7	±0.9	1.7	--	--	--
White Sucker	1	0.5	0.3	±0.4	0.6	--	--	--

* 10 years (2000-2009)

Table 2. Catch per unit effort by length category for various fish species captured with gill nets in Lake Thompson August 2-4, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Walleye	8.0	37.0	32.3	4.3	0.3	45.0	±11.1
Yellow Perch	--	12.0	3.7	2.3	6.0	12.0	±9.8
Common Carp	0.7	0.7	0.7	--	--	1.3	±0.4
White Bass	1.0	--	--	--	--	1.0	±0.7
Northern Pike	0.3	0.3	0.3	--	--	0.7	±0.9
Black Crappie	0.7	--	--	--	--	0.7	±0.9
White Sucker	--	0.3	--	--	0.3	0.3	±0.4

Length categories can be found in Appendix A.

Trap Net Catch

Walleye (39.8%) and common carp (38.3%) were the most abundant species in the trap net catch (Table 3). Other species included black crappie, bigmouth buffalo, northern pike, smallmouth bass, bluegill, and black bullhead.

Table 3. Total catch from twelve overnight trap net sets at Lake Thompson, Kingsbury County, August 2-4, 2010.

Species	No.	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Walleye	109	39.8	9.9	±5.1	8.0	15	0	86
Common Carp	105	38.3	9.5	±3.7	6.1	92	87	89
Black Crappie	20	7.3	1.8	±0.8	3.9	100	95	93
Bigmouth Buffalo	19	6.9	1.7	±1.0	0.2	100	0	80
Northern Pike	15	5.5	1.4	±0.7	3.0	67	33	83
Smallmouth Bass	4	1.5	0.4	±0.3	0.8	--	--	--
Bluegill	1	0.4	0.1	±0.1	0.0	--	--	--
Black Bullhead	1	0.4	0.1	±0.1	62.6	--	--	--

* 10 years (2000-2009)

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Table 4. Catch per unit effort by length category for various fish species captured with trap nets in Lake Thompson August 2-4, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Walleye	0.5	9.5	8.0	1.5	--	9.9	±5.1
Common Carp	2.5	7.0	0.5	0.4	6.1	9.5	±3.7
Black Crappie	--	1.8	--	0.1	1.7	1.8	±0.8
Bigmouth Buffalo	--	1.7	--	1.7	--	1.7	±1.0
Northern Pike	--	1.4	0.5	0.5	0.5	1.4	±0.7
Smallmouth Bass	0.1	0.3	--	0.2	0.1	0.4	±0.3
Bluegill	--	0.1	--	--	0.1	0.1	±0.1
Black Bullhead	--	0.1	--	--	0.1	0.1	±0.1

Length categories can be found in Appendix A.

Walleye

Management objective: Maintain a walleye population with a gill-net CPUE of at least 20, a PSD range of 30-60, and a growth rate of 14 inches by age-3.

Walleye gill-net CPUE increased in 2010 and is well above the management objective (Table 5). However, out of 135 walleyes caught, only two fish were older than age-3. Age-3 fish from the strong, naturally-produced 2007 year class comprised the majority of the 2010 catch (61%) which coincides well with the fall electrofishing results from 2007 (Table 8).

Walleye growth remains within previously observed ranges (Table 6) and condition (mean Wr) has varied little over the past 10 years (Table 5).

Table 5. Walleye gill-net CPUE, PSD, RSD-P and mean Wr for Lake Thompson, Kingsbury County, 2001-2010.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	49.0	31.7	22.8	16.0	34.0	26.0	26.5	12.8	21.8	45.0	28.4
PSD	32	49	27	24	38	22	33	27	1	13	31
RSD-P	8	4	8	4	3	1	2	3	0	1	4
Mean Wr	90	94	83	89	91	88	90	88	87	89	89

*10 years (2000-2009)

Table 6. Weighted mean length at capture (mm) for walleye captured in gill nets in Lake Thompson, Kingsbury County, 2003-2010. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2010 (114)	250 (11)	319 (18)	351 (83)	450 (1)	530 (1)	--	--	--	--	--	--	--
2009 (109)	213 (4)	278 (95)	360 (10)	--	--	--	--	--	--	--	--	--
2008 (64)	212 (30)	343 (24)	--	441 (7)	--	--	493 (2)	--	495 (1)	--	--	--
2007 (91)	282 (48)	331 (8)	410 (28)	438 (4)	--	409 (1)	--	654 (1)	630 (1)	--	--	--
2006 (100)	290 (4)	343 (83)	403 (4)	--	466 (3)	464 (6)	--	--	--	--	--	--
2005 (133)	260 (73)	350 (6)	370 (15)	419 (24)	409 (10)	433 (1)	427 (1)	626 (2)	617 (1)	--	--	--
2004 (88)	262 (5)	321 (17)	347 (38)	375 (19)	472 (5)	508 (1)	532 (1)	607 (1)	--	681 (1)	--	--
2003 (138)	245 (10)	312 (86)	372 (9)	453 (10)	497 (15)	508 (6)	600 (1)	599 (1)	--	--	--	--

Fall electrofishing indicated that natural reproduction may have been relatively weak in 2010 (Table 7). However, electrofishing efficiency around the submerged trees flooded by the rising water may have negatively impacted the sampling effort. The age-0 walleyes sampled grew faster than in any of the last three years and body condition was good. A few yearlings were collected from the weak 2009 year class.

Table 7. Age-0 and age-1 walleyes sampled during 2 hours of nighttime electrofishing on Lake Thompson, Kingsbury County, 1999-2010.

Year	Stocking	Age-0 CPH	80% C.I.	% stocked	Mean length (range; mm)	Wr	Age-1 CPH	80% C.I.	Mean length (range; mm)	Wr
2010	none	27	6-48		175 (135-199)	90	8	2-14	(263-328)	
2009	none	8	0-22		150 (147-154)	113	3		231 (229-233)	83
2008	none	13	7-18		149 (137-161)	103	110	73-147	236 (182-277)	83
2007	none	214	134-294		148 (111-195)	87	2	0-4	332 (324-347)	84
2006	fry[1]	43	29-57	4	203 (167-236)	91	2	0-2	324 (317-328)	85
2005	none	5	2-8		197 (181-200)	104	50	34-67	289 (250-323)	88
2004	Fry	290	132-447	74	131 (110-170)	93	2	1-3	283 (270-290)	85
2003	none	16	6-26		169 (158-181)	94	4	2-6	255 (232-271)	83
2002	none	78	42-114		154 (127-186)	104	13	4-21	260 (218-188)	87
2001	none	202	136-268		169 (129-216)	105	10	6-13	257 (245-269)	89
2000	none	231	117-345		153 (120-192)	93	52	38-66	238 (203-290)	83
1999	none	155	99-211							

[1] Stocked with 17,935 large fingerlings (5.0/lb) after electrofishing was completed.

Yellow Perch

Management objective: Maintain a yellow perch population with a gill-net CPUE of at least 30 and a PSD range of 30-60.

Yellow perch gill-net CPUE remains low, but did improve slightly in 2010 (Table 8). The population age structure suggests limited natural recruitment with no large year classes produced since 2001 (Table 9). Hopefully, the terrestrial vegetation flooded by rising water in 2010 will provide excellent spawning habitat and result in the production of a strong year class in 2011. Lake Thompson yellow perch are always in excellent condition (Table 8) and grow very quickly (Table 9).

Table 8. Yellow perch gill-net CPUE, PSD, RSD-P and mean Wr in Lake Thompson, Kingsbury County, 2001-2010.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	45.2	54.7	6.5	16.3	7.3	3.3	4.0	2.8	3.8	12.0	17.9
PSD	65	20	87	89	76	100	100	57	95	69	75
RSD-P	25	7	3	36	59	54	50	50	11	50	31
Mean Wr	117	117	110	112	107	112	122	117	119	112	115

*10 years (2000-2009)

Table 9. Weighted mean length at capture (mm) for yellow perch captured in gill nets in Lake Thompson, Kingsbury County, 2003-2010. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8
2010	168 (11)	--	250 (21)	266 (3)	310 (1)	--	--	--
2009	--	224 (18)	--	280 (1)	--	--	--	--
2008	156 (6)	--	241 (1)	276 (4)	303 (1)	--	308 (2)	--
2007	--	--	246 (5)	248 (3)	--	280 (4)	--	--
2006	--	224 (5)	--	--	272 (8)	--	--	--
2005	167 (6)	213 (3)	243 (1)	268 (18)	259 (1)	--	--	--
2004	153 (11)	--	243 (80)	263 (5)	288 (2)	261 (2)	--	--
2003	--	216 (35)	243 (4)	--	--	--	--	--

Black Crappie

Black crappie CPUE remains low (Table 10) due to limited, but consistent, recruitment. The crappies sampled were large with most fish measuring between 250 and 350 mm (10 and 14 in) (Figure 3). Condition decreased to 93 which is the lowest recorded since 2004.

Table 10. Black crappie trap-net CPUE, PSD, RSD-P and mean Wr in Lake Thompson, Kingsbury County, 2001-2010.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	5.4	13.0	1.3	1.4	2.5	0.8	1.1	1.8	0.1	1.8	3.9
PSD	96	18	100	97	100	--	100	100	--	100	88
RSD-P	74	16	22	19	100	--	92	65	--	95	52
Mean Wr	122	125	114	92	107	--	106	103	--	93	112

*10 years (2000-2009)

Northern Pike

As with other species, northern pike recruitment has been limited due to declining water levels over the last few years and CPUE will probably stay low (Table 11) until a successful spawn occurs. Water levels increased in Lake Thompson when northern pike spawning was over so little spawning habitat was available this year. The mean length of sampled fish in 2010 was 606 mm (23.8 in) (Figure 4).

Table 11. Northern pike trap-net CPUE, PSD, RSD-P and mean Wr in Lake Thompson, Kingsbury County, 2001-2010.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE	3.9	4.0	5.1	0.9	4.7	0.8	0.5	1.3	1.1	1.4	3.0
PSD	97	82	28	--	96	--	--	93	85	67	81
RSD-P	5	28	19	--	38	--	--	64	46	33	32
Mean Wr	89	84	72	--	80	--	--	76	75	83	80

*10 years (2000-2009)

All Species

Overall, CPUE for most species remained low in 2010 (Table 11) due to poor recruitment during an extended period of low water.

Table 12. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Lake Thompson, Kingsbury County, 2001-2010.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SPS (GN)	2.2	1.0		3.0		0.8	0.5		3.2	
SPS (TN)										
COC (GN)	2.2	5.0	0.7	0.7	4.0	10.5	7.3	3.8	3.2	1.3
COC (TN)	4.1	4.2	5.1	5.8	3.7	4.2	13.7	7.5	0.7	9.5
WHS (GN)	0.7	0.3	0.2		0.8	0.3				0.3
WHS (TN)	0.9	0.3		0.3	0.5			0.3	0.2	
BIB (GN)							0.3	2.0	0.2	
BIB (TN)							0.2	0.4	1.8	1.7
BLB (GN)	5.5	141.7	154.5	10.8						
BLB (TN)	145.1	292.4	122.1	4.0	2.3	0.7	0.1			0.1
NOP (GN)	0.7	1.7	0.8	0.8	0.3	1.5		0.2	0.4	0.7
NOP (TN)	3.9	4.0	5.1	0.9	4.7	0.8	0.5	1.3	1.1	1.4
WHB (GN)						0.3			3.2	1.0
WHB (TN)										
BLG (GN)										
BLG (TN)	0.1									0.1
SMB (GN)	0.7	1.7	0.3	0.2	0.8	0.3	0.3			
SMB (TN)	0.3	1.8	2.0	0.3	0.2	0.4	0.4	0.3	0.8	0.4
BLC (GN)	9.5	4.3	0.3	0.8	0.5	1.0	0.3		0.2	0.7
BLC (TN)	5.4	13.0	1.3	1.4	2.5	0.8	1.1	1.8	0.1	1.8
YEP (GN)	45.2	54.7	6.5	16.3	7.3	3.3	4.0	2.8	3.8	12.0
YEP (TN)	0.4	0.4	0.3					0.1		
WAE (GN)	49.0	31.7	22.8	16.0	34.0	26.0	26.5	12.8	21.8	45.0
WAE (TN)	5.2	7.3	6.9	1.6	26.5	1.2	3.5	14.1	9.0	9.9

SPS (Spottail Shiner), COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), NOP (Northern Pike), WHB (White Bass), BLG (Bluegill), SMB (Smallmouth Bass), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Continue to monitor general fish populations in Lake Thompson with annual netting surveys and conduct fall electrofishing surveys to monitor walleye recruitment.

2. Stock walleye fry when fall electrofishing indicates failed natural reproduction.

Table 13. Stocking record for Lake Thompson, Kingsbury County, 1991-2010.

Year	Number	Species	Size
1991	283	Walleye	Adult
	52,038	Largemouth Bass	Sml. Fingerling
	10,850	Largemouth Bass	Med. Fingerling
	30,000	Smallmouth Bass	Fingerling
	160	Gizzard Shad	Adult
1995	60,000	Largemouth Bass	Fingerling
	100,000	Smallmouth Bass	Fingerling
1996	99,270	Largemouth Bass	Fingerling
	151,870	Smallmouth Bass	Fingerling
2004	10,000,000	Walleye	Fry
2006	6,250,000	Walleye	Fry
	17,935	Walleye	Lrg. Fingerling

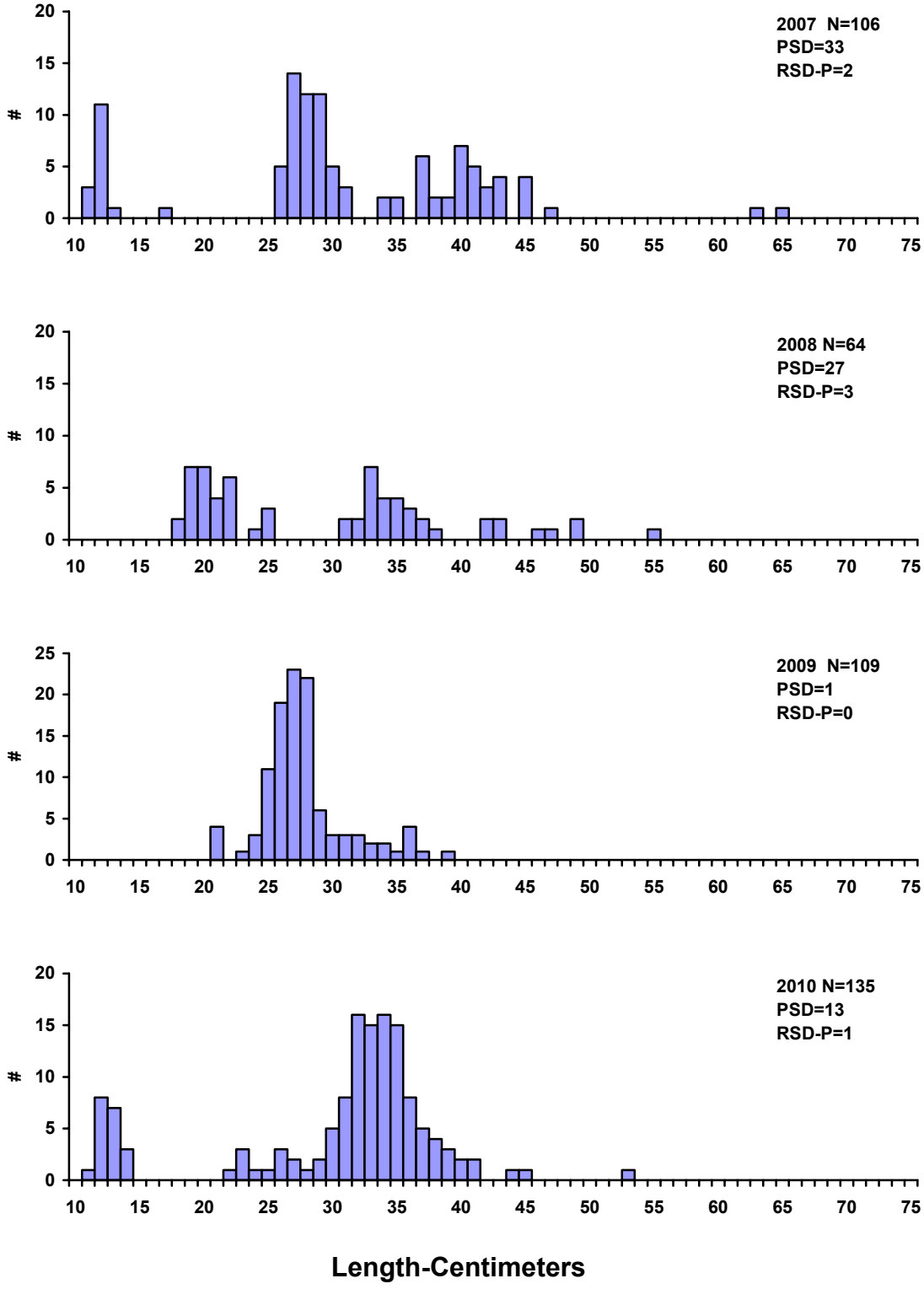

Figure 1. Length frequency histograms for walleye sampled with gill nets in Lake Thompson, Kingsbury County, 2007-2010.

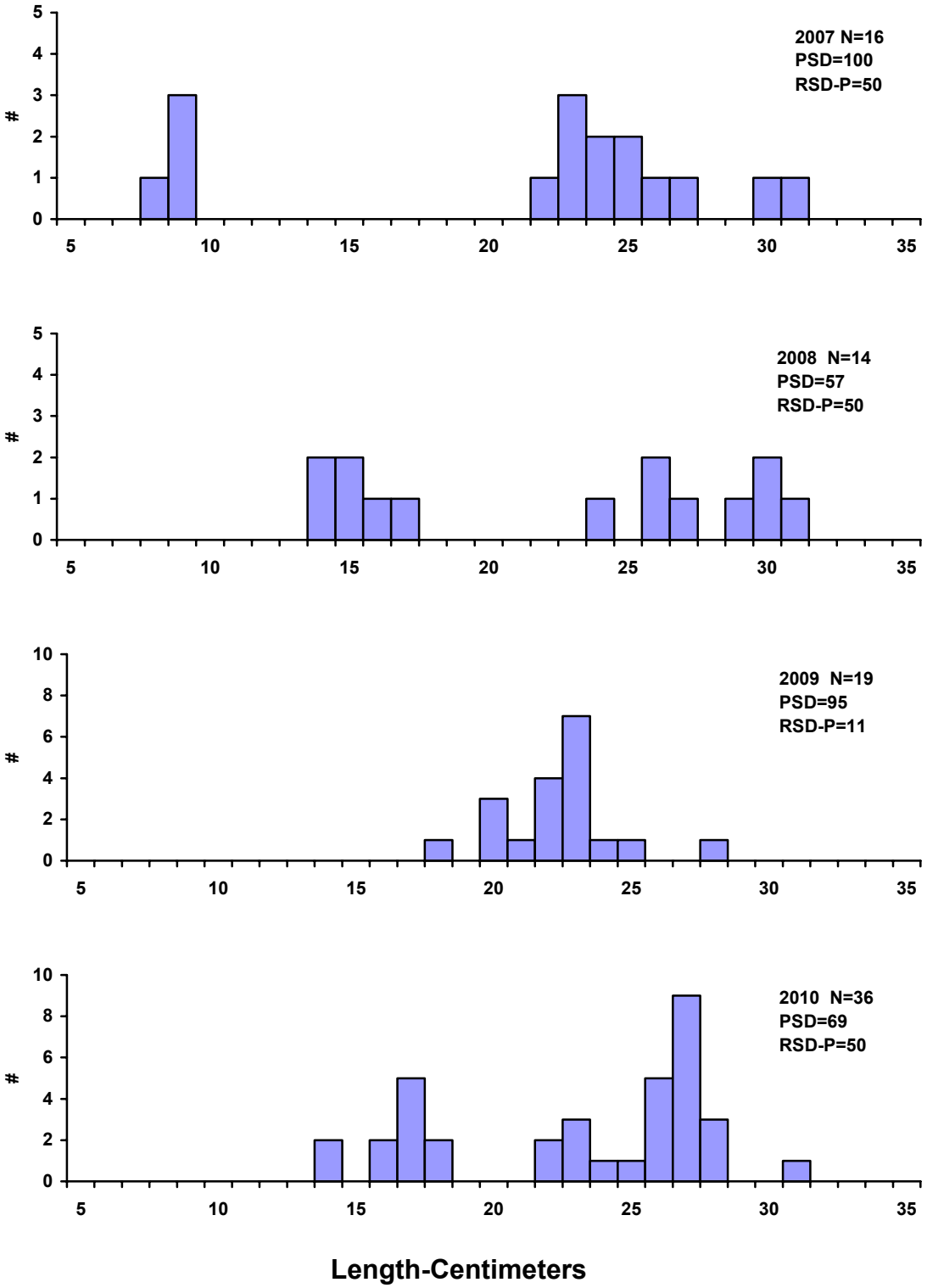

Figure 2. Length frequency histograms for yellow perch sampled with gill nets in Lake Thompson, Kingsbury County, 2007-2010.

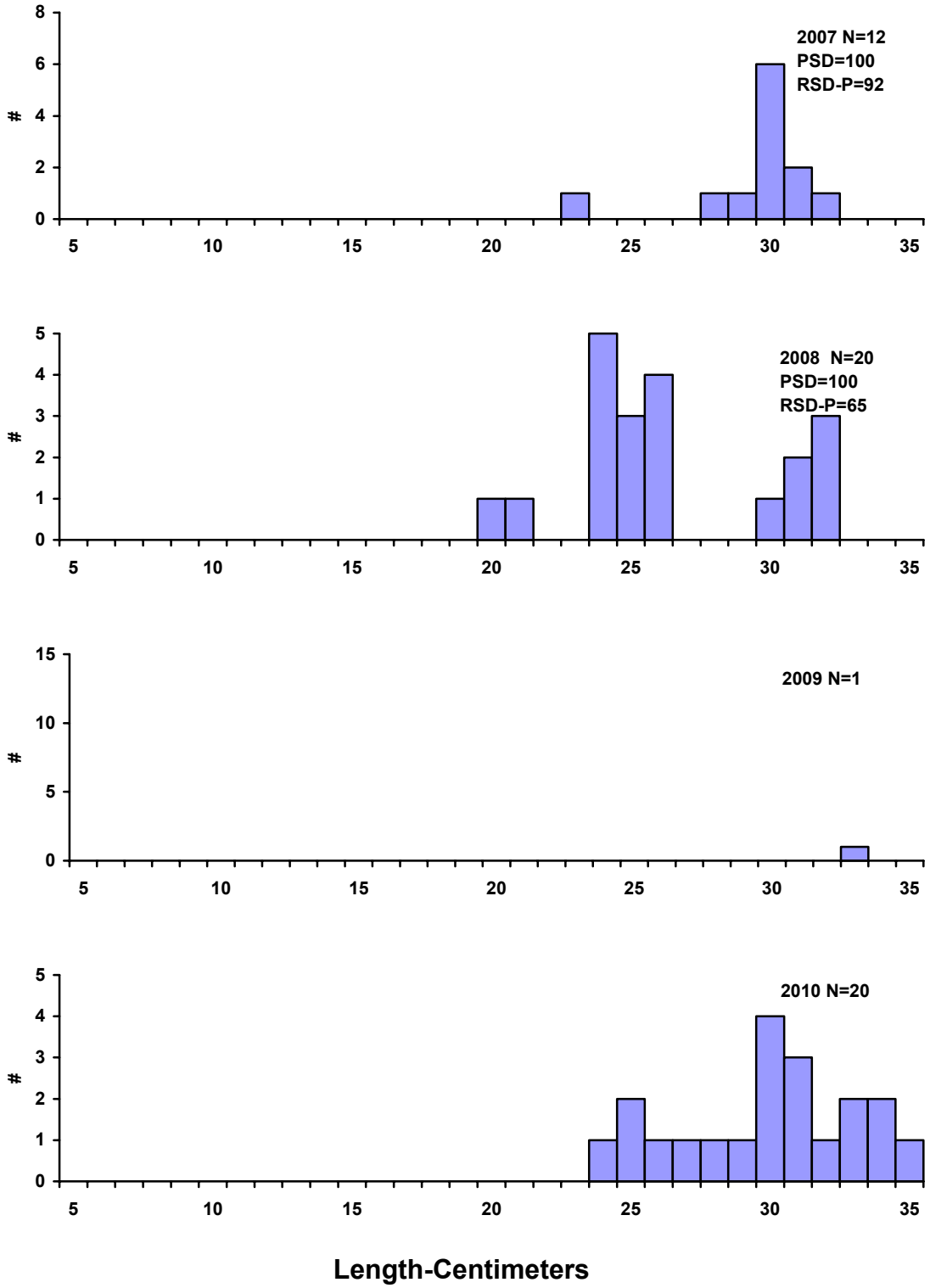

Figure 3. Length frequency histograms for black crappies sampled with trap nets in Lake Thompson, Kingsbury County, 2007-2010.

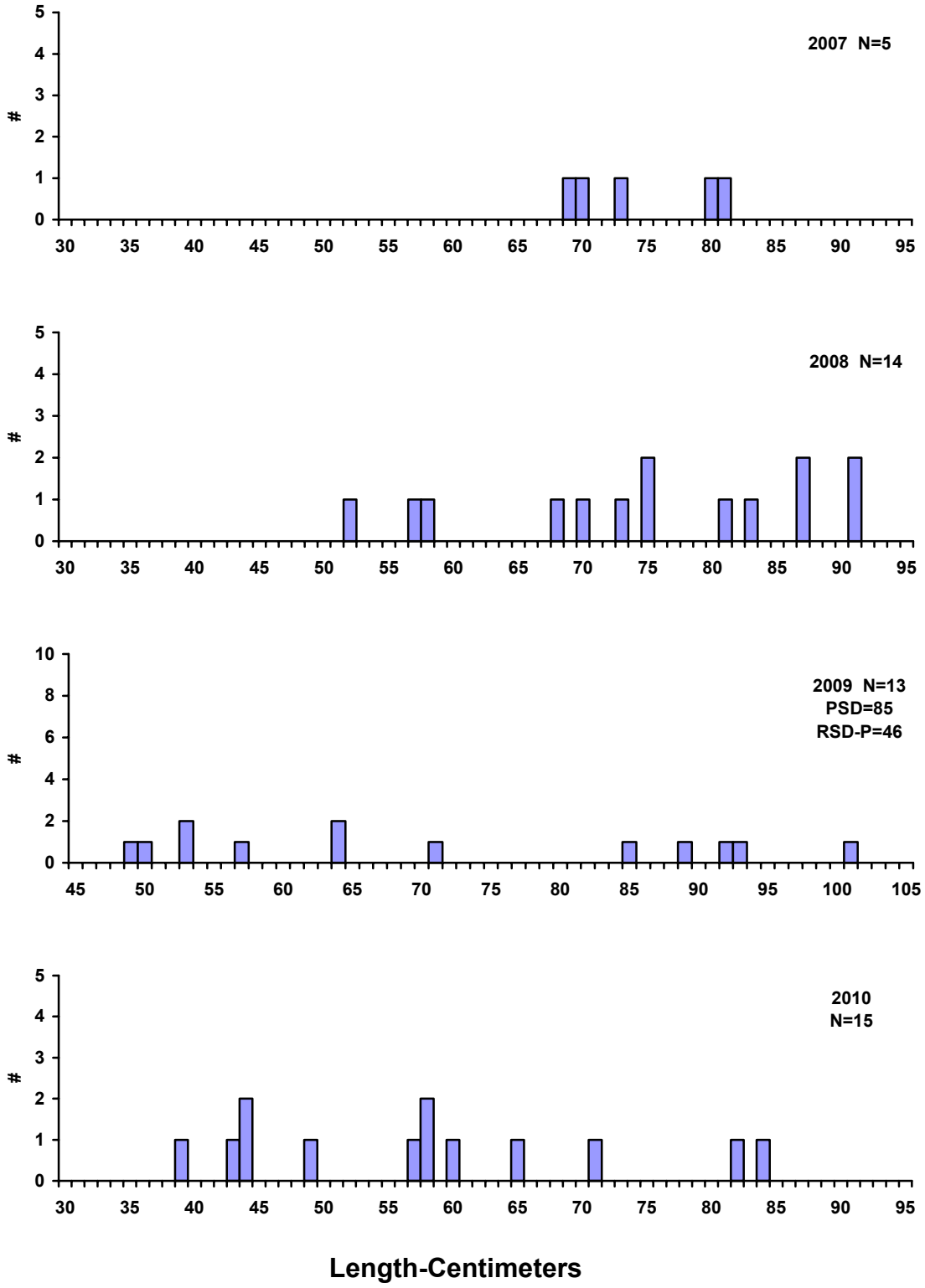

Figure 4. Length frequency histograms for northern pike sampled with trap nets in Lake Thompson, Kingsbury County, 2007-2010.

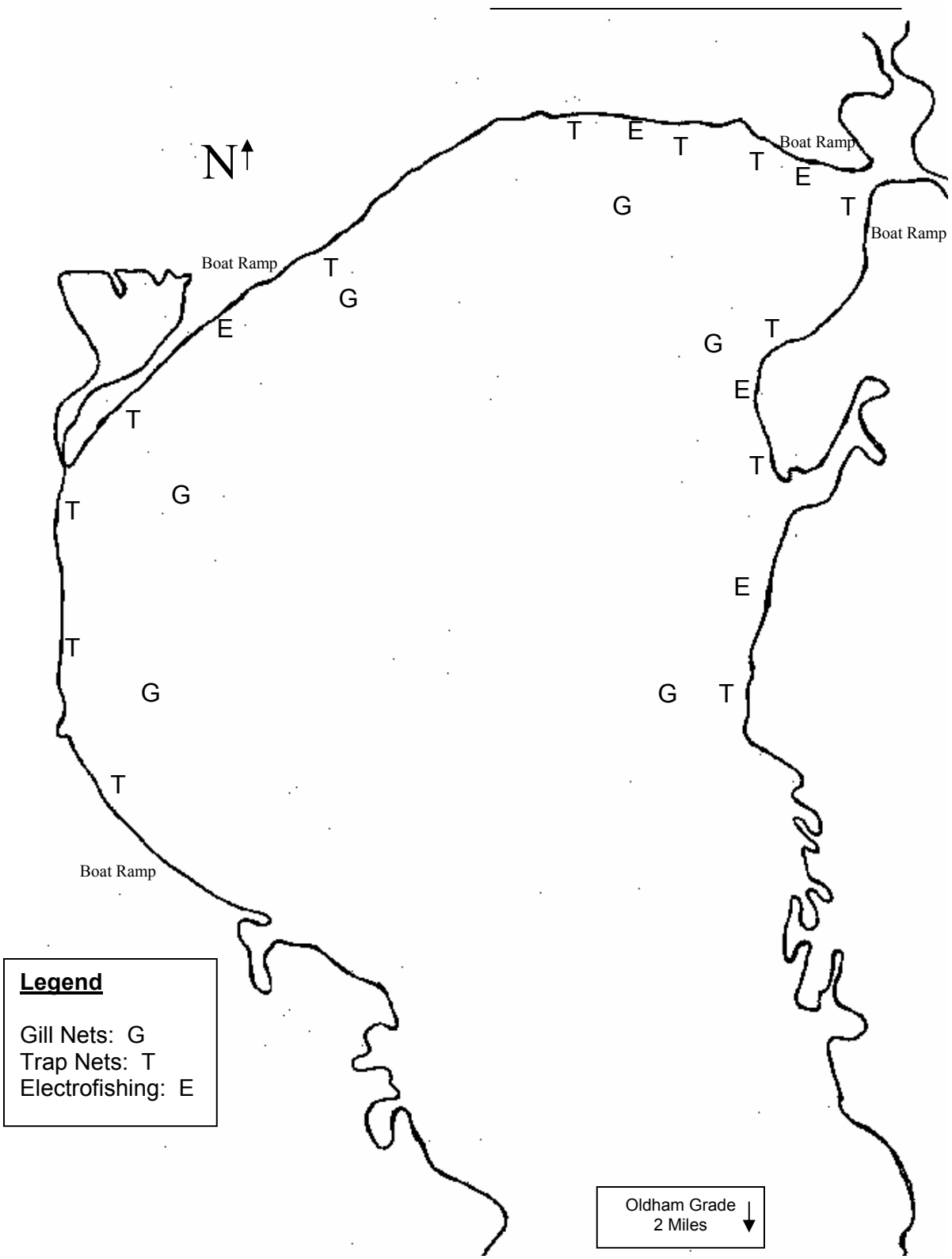

Figure 5. Sampling locations on Lake Thompson, 2010.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.